US009298154B2

(12) **United States Patent**
Shokai

(10) **Patent No.: US 9,298,154 B2**
(45) **Date of Patent: Mar. 29, 2016**

(54) **IMAGE PROCESSING APPARATUS WITH JOB RECOVERY FUNCTION**

(71) Applicants: **KABUSHIKI KAISHA TOSHIBA**, Tokyo (JP); **TOSHIBA TEC KABUSHIKI KAISHA**, Tokyo (JP)

(72) Inventor: **Takeharu Shokai**, Shizuoka-ken (JP)

(73) Assignees: **Kabushiki Kaisha Toshiba**, Tokyo (JP); **Toshiba Tec Kabushiki Kaisha**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 44 days.

(21) Appl. No.: **14/149,419**

(22) Filed: **Jan. 7, 2014**

(65) **Prior Publication Data**

US 2014/0219667 A1 Aug. 7, 2014

(30) **Foreign Application Priority Data**

Feb. 4, 2013 (JP) 2013-019314

(51) **Int. Cl.**
B41J 29/38 (2006.01)
G03G 21/00 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 21/00*** (2013.01); ***B41J 29/38*** (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,763,162	A *	8/1988	Yagasaki	399/18
2007/0160378	A1 *	7/2007	Matsuda	399/79
2010/0315475	A1 *	12/2010	Taki et al.	347/179
2011/0205575	A1 *	8/2011	Karasawa	358/1.14
2011/0262197	A1 *	10/2011	Imamiya et al.	399/341
2012/0082472	A1	4/2012	Tonohiro	
2012/0315591	A1	12/2012	Tsuchihashi et al.	

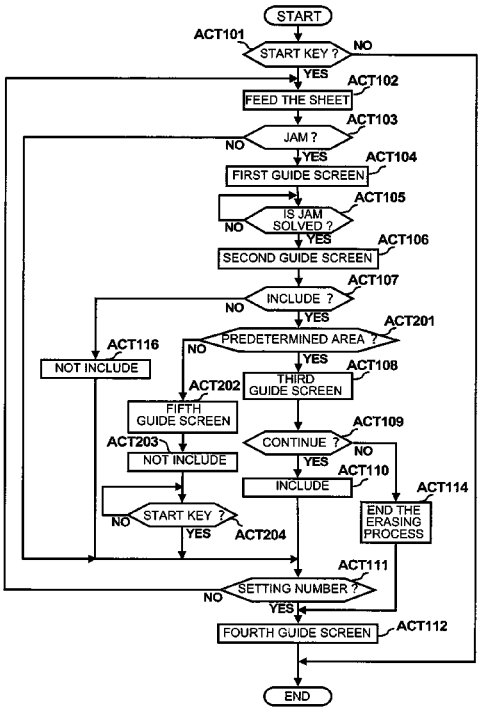
* cited by examiner

Primary Examiner — Daniel J Colilla
Assistant Examiner — Ruben Parco, Jr.
(74) *Attorney, Agent, or Firm* — Patterson & Sheridan, LLP

(57) **ABSTRACT**

According to embodiments, provided is an image processing apparatus that includes an erasing unit, an operation panel, and a control unit. The erasing unit erases an image formed on a conveyed recording medium. The operation panel receives the setting of the number of the recording mediums from which the image is removed. The control unit continues the image erasing process until a value obtained by counting the number of the recording mediums conveyed to the erasing unit by including the number of the recording mediums causing a conveyance error reaches the setting number when resuming the image erasing process after stopping the image erasing process in the event of the conveyance error of the recording medium.

7 Claims, 10 Drawing Sheets



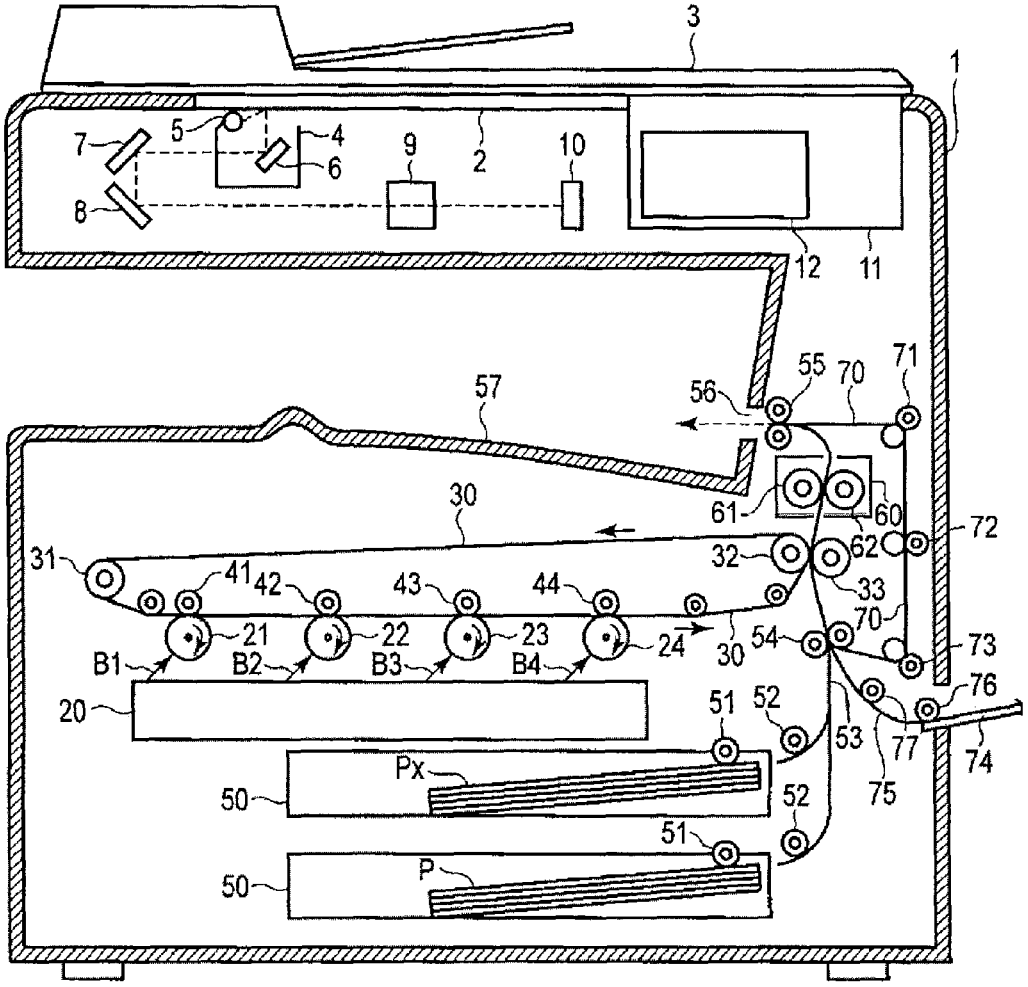

3
1
7
5
4
6
9
2
10
8
12
11
57
56
55
70
71
61
60
72
30
31
41
42
43
44
32
62
33
70
21
22
23
24
30
54
73
B1
B2
B3
B4
20
51
52
76
53
77
74
Px
50
52
75
51
P
50

Fig.1

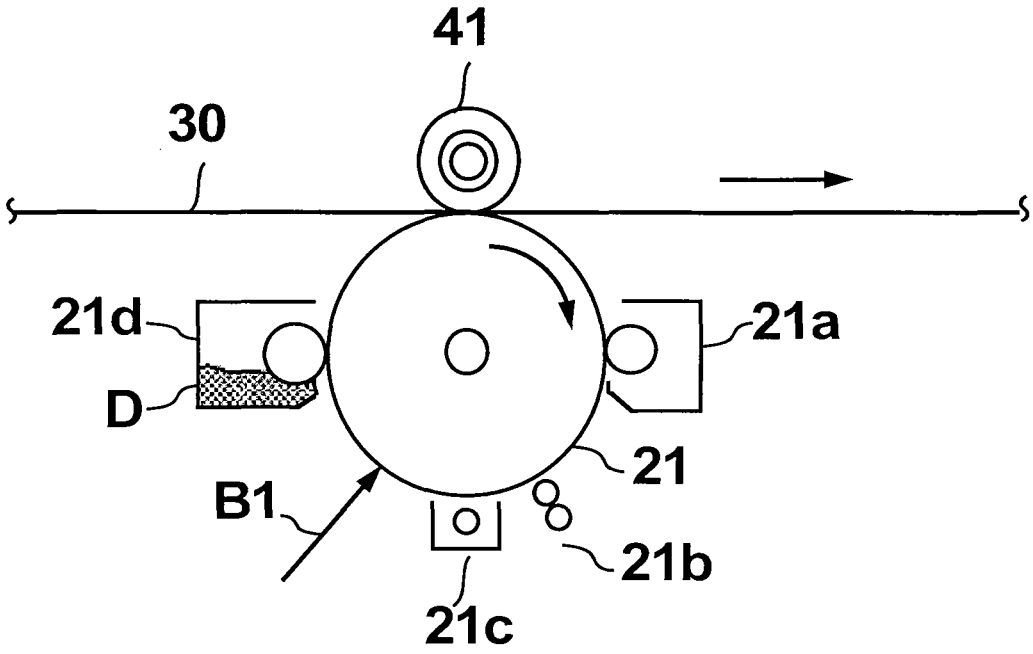


Fig.2

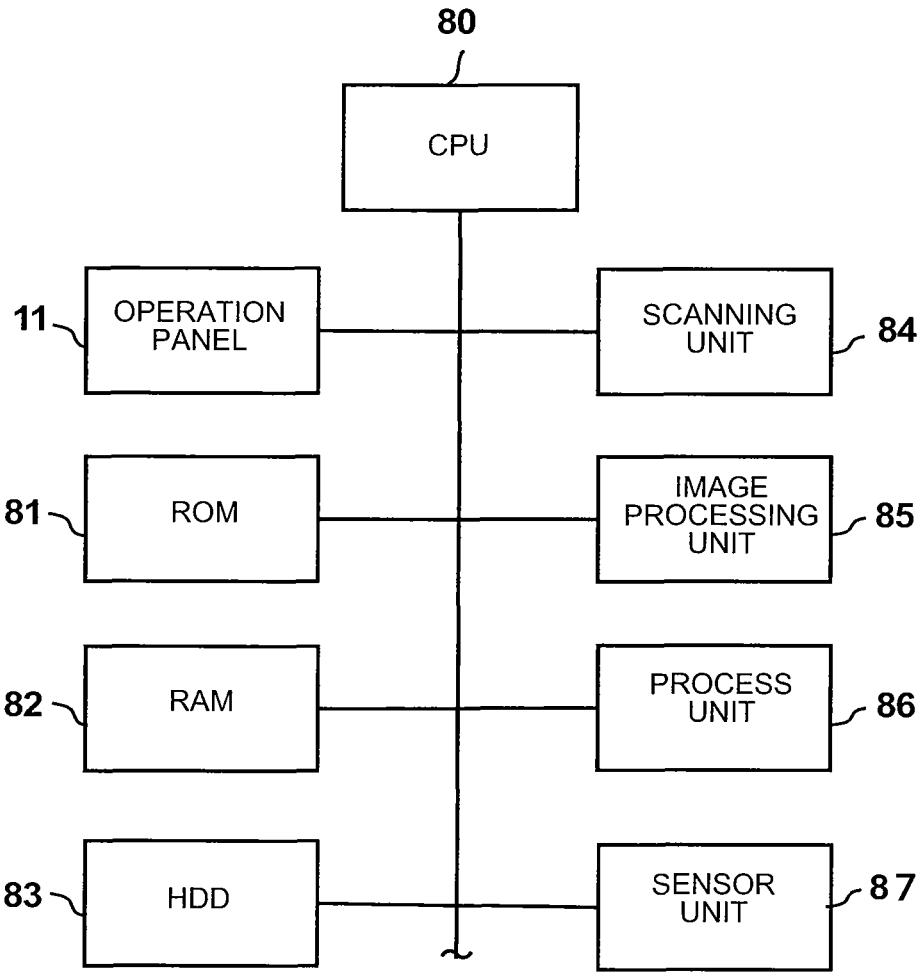

80
CPU
11
OPERATION PANEL
SCANNING UNIT
84
81
ROM
IMAGE PROCESSING UNIT
85
82
RAM
PROCESS UNIT
86
83
HDD
SENSOR UNIT
87

Fig.3

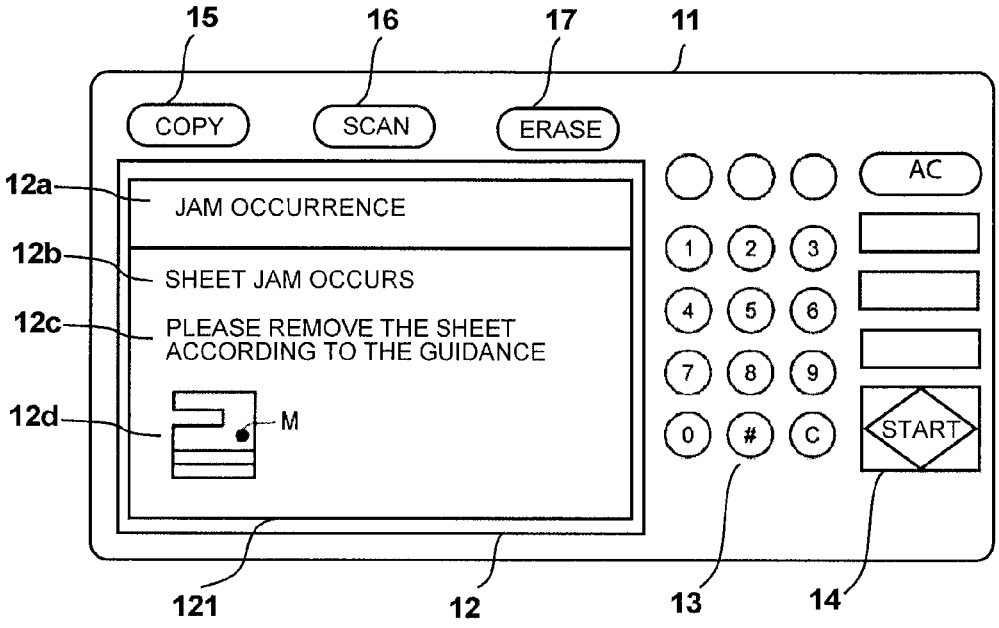

15
16
17
11
COPY
SCAN
ERASE
12a
JAM OCCURRENCE
12b
SHEET JAM OCCURS
12c
PLEASE REMOVE THE SHEET
ACCORDING TO THE GUIDANCE
12d
M
AC
1
2
3
4
5
6
7
8
9
0
#
C
START
121
12
13
14

Fig.4

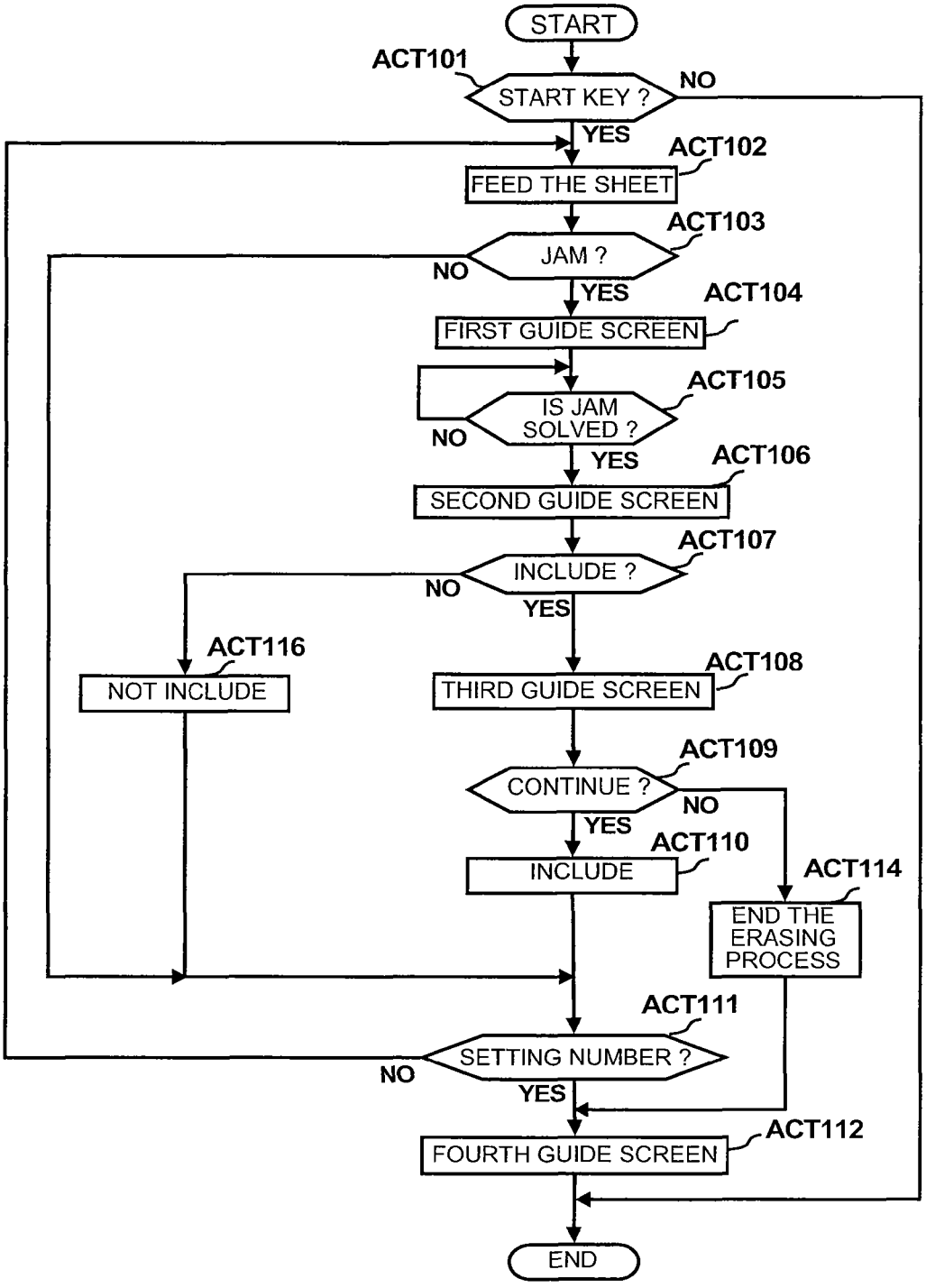

START
ACT101
START KEY ?
NO
YES
ACT102
FEED THE SHEET
ACT103
JAM ?
NO
YES
ACT104
FIRST GUIDE SCREEN
ACT105
IS JAM SOLVED ?
NO
YES
ACT106
SECOND GUIDE SCREEN
ACT107
INCLUDE ?
NO
YES
ACT116
NOT INCLUDE
ACT108
THIRD GUIDE SCREEN
ACT109
CONTINUE ?
NO
YES
ACT110
INCLUDE
ACT114
END THE ERASING PROCESS
ACT111
SETTING NUMBER ?
NO
YES
ACT112
FOURTH GUIDE SCREEN
END

Fig.5

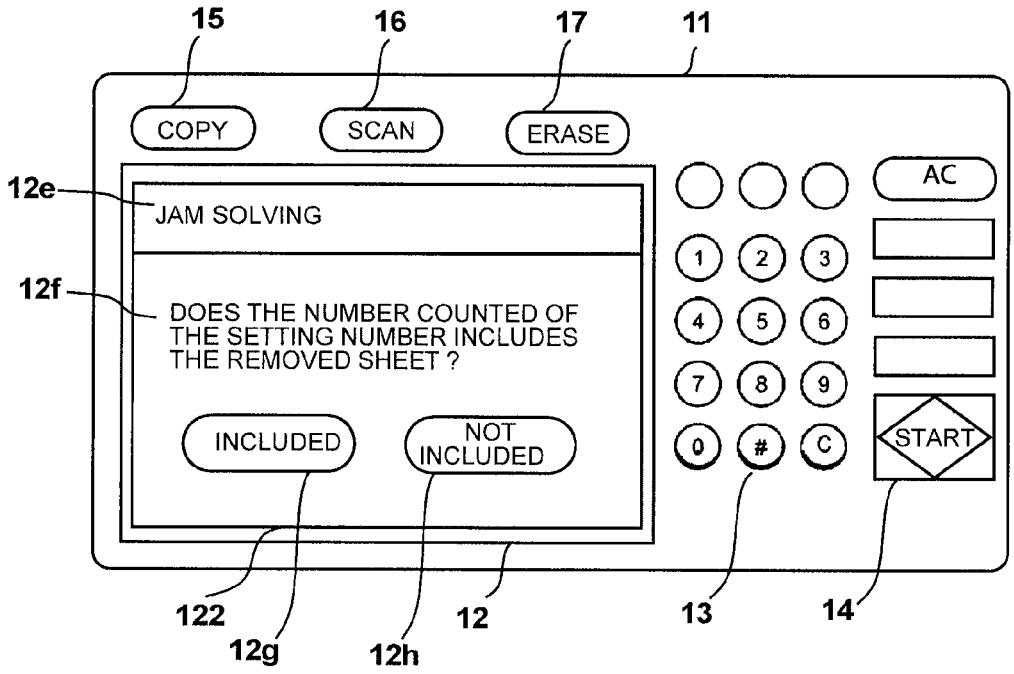

15
16
17
11
COPY
SCAN
ERASE
12e
JAM SOLVING
12f
DOES THE NUMBER COUNTED OF THE SETTING NUMBER INCLUDES THE REMOVED SHEET ?
INCLUDED
NOT INCLUDED
AC
1
2
3
4
5
6
7
8
9
0
#
C
START
122
12g
12h
12
13
14

Fig.6

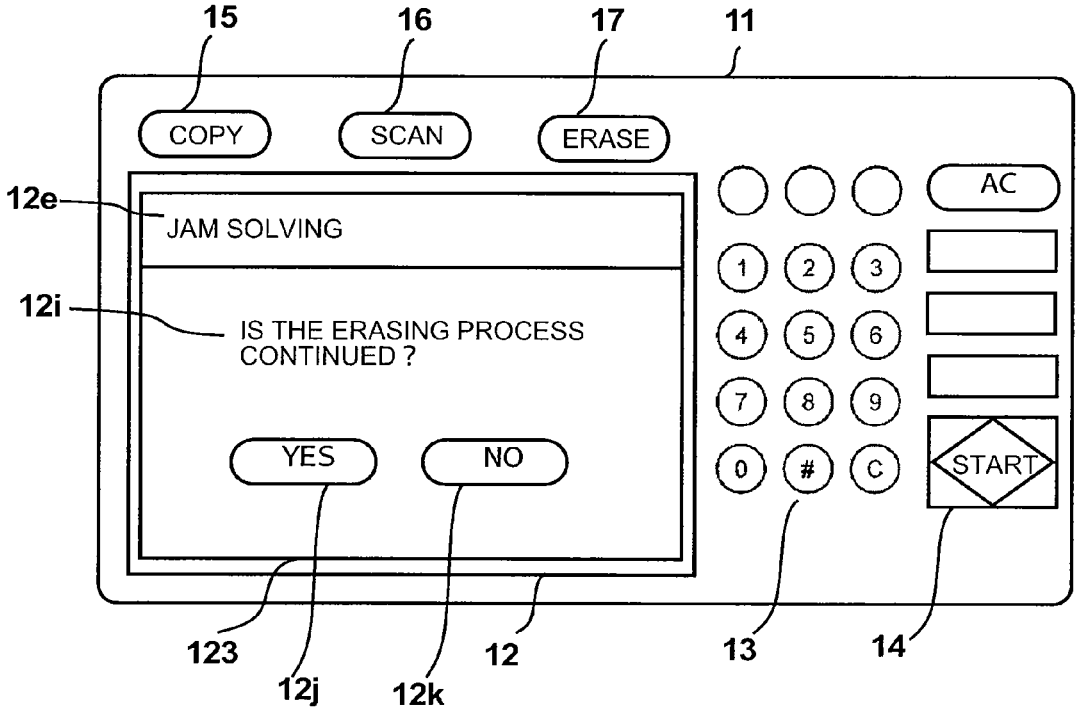

15
16
17
11
COPY
SCAN
ERASE
12e
JAM SOLVING
12i
IS THE ERASING PROCESS CONTINUED ?
YES
NO
AC
1
2
3
4
5
6
7
8
9
0
#
C
START
123
12j
12k
12
13
14

Fig.7

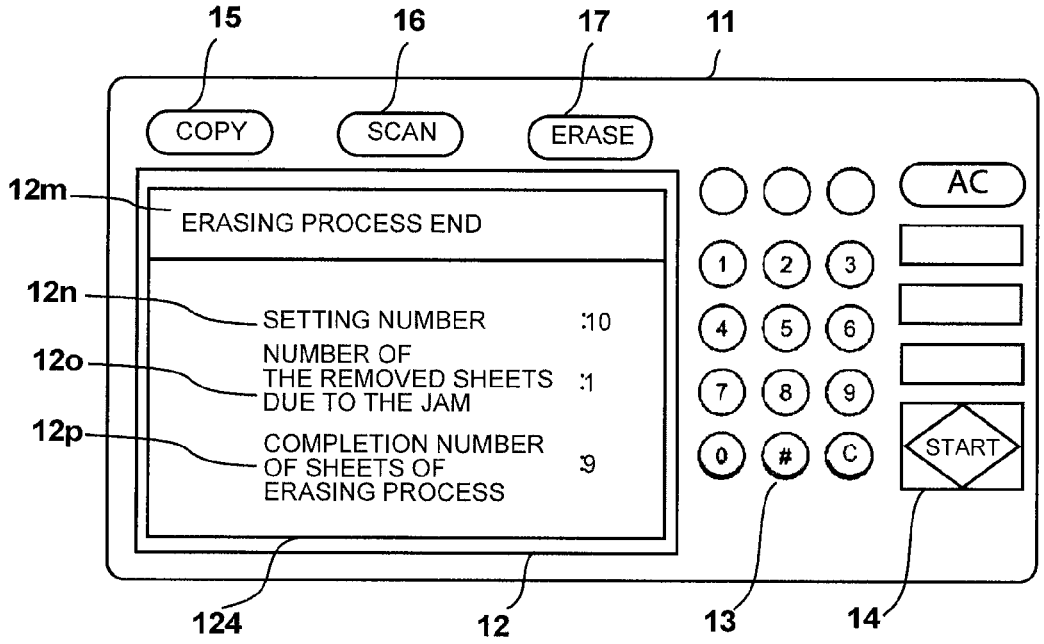

15
16
17
11
COPY
SCAN
ERASE
12m
ERASING PROCESS END
12n
SETTING NUMBER :10
12o
NUMBER OF THE REMOVED SHEETS DUE TO THE JAM :1
12p
COMPLETION NUMBER OF SHEETS OF ERASING PROCESS :9
AC
1
2
3
4
5
6
7
8
9
0
#
C
START
124
12
13
14

Fig.8

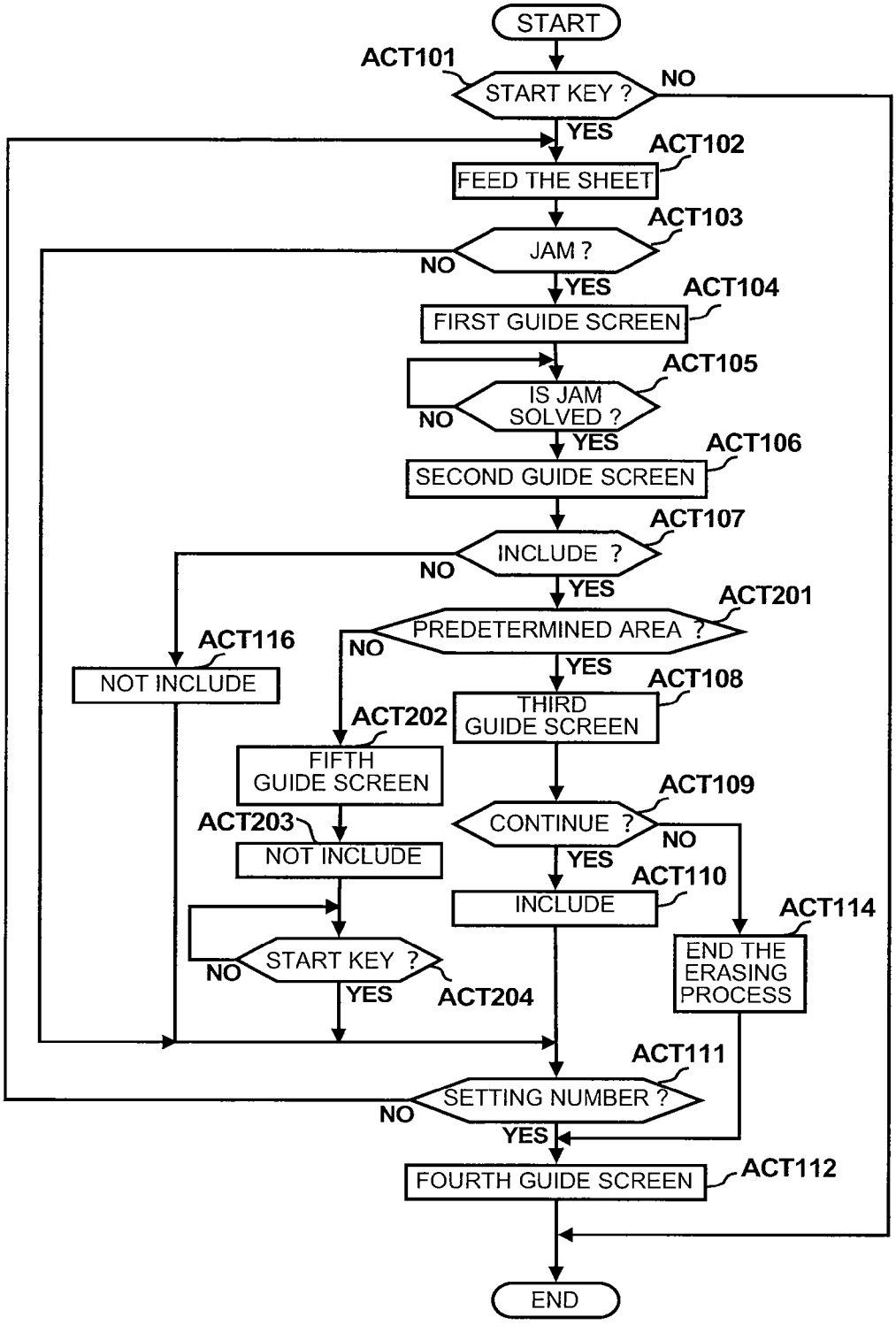

START
ACT101
START KEY ?
NO
YES
ACT102
FEED THE SHEET
ACT103
JAM ?
NO
YES
ACT104
FIRST GUIDE SCREEN
ACT105
IS JAM SOLVED ?
NO
YES
ACT106
SECOND GUIDE SCREEN
ACT107
INCLUDE ?
NO
YES
ACT201
PREDETERMINED AREA ?
NO
YES
ACT116
NOT INCLUDE
ACT108
THIRD GUIDE SCREEN
ACT202
FIFTH GUIDE SCREEN
ACT109
CONTINUE ?
NO
YES
ACT203
NOT INCLUDE
ACT110
INCLUDE
ACT114
END THE ERASING PROCESS
START KEY ?
NO
YES
ACT204
ACT111
SETTING NUMBER ?
NO
YES
ACT112
FOURTH GUIDE SCREEN
END

Fig.9

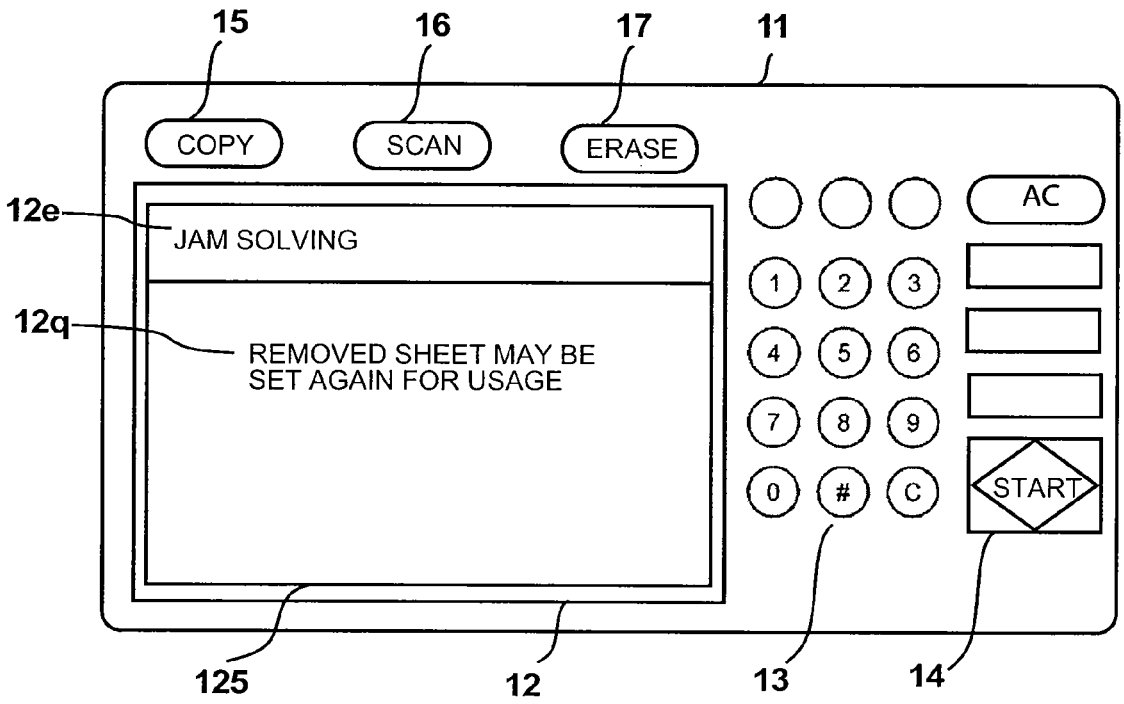

15
16
17
11
COPY
SCAN
ERASE
12e
JAM SOLVING
12q
REMOVED SHEET MAY BE
SET AGAIN FOR USAGE
AC
1
2
3
4
5
6
7
8
9
0
#
C
START
125
12
13
14

Fig.10

IMAGE PROCESSING APPARATUS WITH JOB RECOVERY FUNCTION

CROSS-REFERENCE TO RELATED APPLICATION

This application is based upon and claims the benefit of priority from the prior Japanese Patent Application No. 2013-19314, filed on Feb. 4, 2013, the entire contents of which are incorporated herein by reference.

FIELD

Embodiments described herein relate generally to an image processing apparatus that has a function of erasing an image formed on a recording medium.

There is known an image processing apparatus (a so-called image forming apparatus) that forms an image on a recording medium, for example, a sheet by using a developer which may be decolored. The developer that is used in the image processing apparatus is maintained in a visible state while being colored at a temperature lower than a predetermined value, and becomes an invisible state while being decolored at a temperature equal to or higher than the predetermined value.

Further, there is known an image processing apparatus (a so-called image erasing apparatus) dedicated for an image erasing process that erases an image in a manner such that an image formed on a sheet by the image processing apparatus is heated at a predetermined temperature value or more so as to decolor the image. The sheet from which the image is erased may be reused as an image forming sheet.

Furthermore, there is also known a hybrid image processing apparatus that has an image erasing function and an image forming function.

In the image processing apparatus having the image erasing function, a user sets ten sheets having an image formed thereon on a sheet feeding cassette or an input tray of the image processing apparatus, for example, when the user wants to collectively perform an image erasing process on the ten sheets having an image formed thereon (hereinafter, referred to as image formed sheets). The user sets, for example, the erasing operation mode and the erasing number of "10" by an operation panel of the image processing apparatus. Further, the user starts the image erasing process in the image processing apparatus by operating a start key of the operation panel.

The image processing apparatus performs an image process such as an image erasing process while conveying the sheet. In the image processing apparatus, a conveyance error (a so-called jam) may occur in which the sheet is not conveyed while being jammed in a conveyance path inside the apparatus. In the event of the jam, the image processing apparatus stops an image process such as an image erasing process. The image processing apparatus resumes the stopped image process when the sheet jammed in the conveyance path inside the apparatus is removed by the user. In many cases, the removed sheet is discarded by the user.

In a case where the image processing apparatus resumes the image process after removing the sheet, the image processing apparatus resumes the image process from the state immediately before the occurrence of the jam without counting the number of the removed sheets as the number of the sheets to be subjected to the image process. For example, when the number of the sheets set to be subjected to the erasing process is "10" as described above, the erasing process is performed on the third sheet, and the jam occurs during the erasing process performed on the fourth sheet, the image processing apparatus stops the erasing process. When the fourth sheet remaining in the conveyance path inside the apparatus is removed by the user, the image processing apparatus resumes the image erasing process. Since the image processing apparatus does not count the fourth sheet as the number of the sheets to be subjected to the image erasing process, the other seven sheets with respect to the number of the sheets set to be subjected to the erasing process are fed from the sheet feeding cassette or the input tray so as to perform the image erasing process thereon.

In a case of the image erasing process, the number of the sheets that are subjected to the image erasing process by the image processing apparatus and are discharged to the outside of the apparatus finally becomes equal to the number of the sheets set to be subjected to the image erasing process, that is, ten sheets. However, the number of the sheets that are fed from the sheet feeding cassette or the input tray by the image processing apparatus becomes eleven sheets more than the number of the sheets set to be subjected to the erasing process.

Since the sheets more than the setting number of the sheets are fed, sheets different from the ten image formed sheets set in advance on the sheet feeding cassette or the input tray for the erasing process need to be also set on the sheet feeding cassette or the input tray.

When image forming sheets which do not need the image erasing process, for example, sheets on which an image is not formed are originally set on the sheet feeding cassette or the input tray, the image erasing process performed on the set sheets becomes a useless process, and hence power is uselessly consumed in the image processing apparatus.

Even when the sheets originally set on the sheet feeding cassette or the input tray are the image formed sheets, some users may desire a configuration in which the sheets more than the setting number are not fed from the sheet feeding cassette or the input tray.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross-sectional view illustrating the entire configuration of an image processing apparatus according to a first embodiment;

FIG. **2** is a diagram illustrating the configurations of a photosensitive drum of the image processing apparatus according to the first embodiment and the peripheral components thereof;

FIG. **3** is a block diagram illustrating the control configuration of the image processing apparatus according to the first embodiment;

FIG. **4** is a diagram illustrating a first guide screen that is displayed on a display unit and an operation panel of the image processing apparatus according to the first embodiment;

FIG. **5** is a flowchart illustrating the control operation of the image processing apparatus according to the first embodiment;

FIG. **6** is a diagram illustrating a second guide screen that is displayed on the display unit and the operation panel of the image processing apparatus according to the first embodiment;

FIG. **7** is a diagram illustrating a third guide screen that is displayed on the display unit and the operation panel of the image processing apparatus according to the first embodiment;

FIG. **8** is a diagram illustrating a fourth guide screen that is displayed on the display unit and the operation panel of the image processing apparatus according to the first embodiment;

FIG. **9** is a flowchart illustrating the control operation of an image processing apparatus according to a second embodiment; and

FIG. **10** is a diagram illustrating a fifth guide screen that is displayed on a display unit and an operation panel of the image processing apparatus according to the second embodiment.

DETAILED DESCRIPTION

According to embodiments, provided is an image processing apparatus that includes an erasing unit, an operation panel, and a control unit. The erasing unit erases an image formed on a conveyed recording medium. The operation panel receives the setting of the number of the recording mediums from which the image is erased. In a case where the image erasing process is stopped due to a conveyance error of the recording medium and the image erasing process is resumed, the control unit continues the image erasing process until a value obtained by counting the number of the recording mediums conveyed to the erasing unit together with the number of the recording mediums causing the conveyance error reaches a setting number.

Hereinafter, embodiments will be described further with reference to the drawings. In the drawings, the same reference numerals indicate the same or similar components.

A first embodiment will be described with reference to FIG. **1**. FIG. **1** is a cross-sectional view illustrating the entire configuration of an image processing apparatus according to the first embodiment.

An image processing apparatus **1** according to the first embodiment illustrated in FIG. **1** includes an image forming mode, an image erasing mode, an image reading mode, and the like as operation modes. The image forming mode is an operation mode that may perform an image forming process in which the image processing apparatus **1** forms an image on a sheet. The image erasing mode is an operation mode that may perform an image erasing process in which the image processing apparatus **1** erases an image formed on a sheet. The image reading mode is an operation mode that may perform an image reading process in which the image processing apparatus **1** reads an image of a document. The image processing apparatus **1** performs each process of each operation mode in response to an operation in which a start key to be described later is operated by a user in each operation mode.

As illustrated in FIG. **1**, the image processing apparatus **1** includes a document plate **2**, a cover **3**, a carriage **4**, and an exposure lamp **5**. The document plate **2** is disposed at the upper portion of the body of the image processing apparatus **1**. The document plate **2** is formed by a transparent member, for example, a glass plate. The document plate **2** holds a document that is placed thereon by the user. The cover **3** is disposed on the document plate **2** in an openable and closable manner. The carriage **4** is disposed on the lower surface side of the document plate **2**. The exposure lamp **5** is disposed in the carriage **4**.

The image processing apparatus **1** includes a scanning unit **84** that reads an image of a document held by the document plate **2**. The scanning unit **84** is operated in the image reading process of the image forming mode or the image reading mode. The scanning unit **84** includes reflection mirrors **6**, **7**, and **8**, a magnification lens block **9**, and a charge coupled device (CCD) **10** other than the carriage **4** and the exposure lamp **5**. In the image reading process of the scanning unit **84**, the carriage **4** moves along the lower surface of the document plate **2**. The exposure lamp **5** exposes a document on the document plate **2** by a beam in accordance with the reciprocating movement of the carriage **4**. The reflection mirrors **6**, **7**, and **8** lead the beam, which is reflected from the document and generated by the above-described exposure, to the magnification lens block **9**. The magnification lens block **9** optically magnifies an image formed by the reflected beam and leads the image to the CCD **10**. The CCD **10** outputs an image signal of a level corresponding to the reflected beam image.

The image processing apparatus **1** includes an operation panel **11** that receives the condition of each operation mode set by the user. The operation panel **11** is disposed near the document plate **2**. The operation panel **11** includes a touch panel type liquid crystal display unit **12**.

The image processing apparatus **1** includes an exposure unit **20**. The exposure unit **20** is operated in the image forming process of the image forming mode. Based on, for example, the image signal output from the CCD **10**, the exposure unit **20** emits each of a laser beam B**1** corresponding to a yellow image signal, a laser beam B**2** corresponding to a magenta image signal, a laser beam B**3** corresponding to a cyan image signal, and a laser beam B**4** corresponding to a black image signal toward each of a photosensitive drum **21** as a yellow image carrier, a photosensitive drum **22** as a magenta image carrier, a photosensitive drum **23** as a cyan image carrier, and a photosensitive drum **24** as a black image carrier.

The image processing apparatus **1** includes the photosensitive drums **21** to **24** and a transfer belt **30** as an image carrier. The photosensitive drums **21** to **24** are arranged in parallel at a predetermined interval along the transfer belt **30**. In FIG. **1**, the transfer belt **30** is disposed above the photosensitive drums **21** to **24**. The transfer belt **30** is suspended between a drive roller **31** and a driven roller **32**. The transfer belt **30** rotates in the counter-clockwise direction by the power generated from the drive roller **31**.

The image processing apparatus **1** includes primary transfer rollers **41**, **42**, **43**, and **44**. The primary transfer rollers **41** to **44** are respectively disposed at the positions facing the photosensitive drums **21** to **24** with the transfer belt **30** interposed therebetween so as to be movable up and down. The primary transfer rollers **41** to **44** are operated in the image forming process of the image forming mode. The primary transfer rollers **41** to **44** rotate while pressing the transfer belt **30** against the circumferential surfaces of the photosensitive drums **21** to **24**, so that images (erasable toner images to be described later) formed on the photosensitive drums **21** to **24** are transferred to the transfer belt **30**.

The configurations of the photosensitive drum **21** and the peripheral components will be described in detail with reference to FIG. **2**. FIG. **2** is a diagram illustrating the configurations of the photosensitive drum **21** and the peripheral components. As illustrated in FIG. **2**, the image processing apparatus **1** includes a cleaner **21***a*, a neutralizing lamp **21***b*, a charging unit **21***c*, and a developing unit **21***d*. The cleaner **21***a*, the neutralizing lamp **21***b*, the charging unit **21***c*, and the developing unit **21***d* are operated in the image forming process of the image forming mode. The cleaner **21***a*, the neutralizing lamp **21***b*, the charging unit **21***c*, and the developing unit **21***d* are disposed around the photosensitive drum **21** in this order. The cleaner **21***a* removes an erasable toner that remains on the surface of the photosensitive drum **21** after the transfer operation. The neutralizing lamp **21***b* removes a charge remaining on the surface of the photosensitive drum **21**. The charging unit **21***c* uniformly charges the surface of the photosensitive drum **21** by applying a static charge to the surface of the photosensitive drum **21**.

The exposure unit **20** forms an electrostatic latent image by emitting the laser beam B**1** to the charged photosensitive

drum **21**. The developing unit **21***d* stores a yellow developer D. The developing unit **21***d* forms a yellow erasable toner image by developing the electrostatic latent image while supplying the erasable toner included in the yellow developer D to the photosensitive drum **21**.

The image processing apparatus **1** also includes the cleaner, the neutralizing lamp, the charging unit, and the developing unit around the other photosensitive drums **22**, **23**, and **24**. Since the peripheral configurations of the photosensitive drums **22** to **24** are the same as the peripheral configuration of the photosensitive drum **21**, the description thereof will not be repeated. The photosensitive drums **22**, **23**, and **24** form erasable toner images of respective colors of magenta, cyan, and black.

The developer D of each color is, for example, a mixture of an erasable toner and a magnetic carrier. The erasable toner is maintained in a visible state while being colored at a value lower than a predetermined temperature value, and becomes an invisible state while being decolored due to the heating at the predetermined temperature value or more. The erasable toner includes a dye and a coloring substance. The dye and the coloring substance are bonded to each other when the environmental temperature is lower than a predetermined value, for example, 120° C. Due to this relation, the color of the dye becomes a visible state. The relation between the dye and the coloring substance becomes invalid when the environmental temperature is the predetermined value or more. When the relation becomes invalid, the color of the dye becomes an invisible state.

The image processing apparatus **1** includes a plurality of sheet feeding cassettes **50**. The sheet feeding cassettes **50** are disposed below the exposure unit **20**. The sheet feeding cassettes **50** store sheets P as subjects for the image forming process of the image forming mode. The plurality of sheet feeding cassettes **50** store different sizes of sheets P. Among the plurality of sheet feeding cassettes **50**, the sheet feeding cassette **50** that is located at the uppermost stage also serves as a sheet feeding cassette that stores sheets Px as subjects for the image erasing process of the image erasing mode.

The image processing apparatus **1** includes a pickup roller **51**, a sheet feeding roller **52**, and a conveyance path **53**. The pickup roller **51** and the sheet feeding roller **52** are disposed for each of the plurality of sheet feeding cassettes **50**. The respective pickup rollers **51** extract the sheets P and Px inside the respective sheet feeding cassettes **50** one by one. The respective sheet feeding rollers **52** feed the sheets P and Px extracted by the respective pickup rollers **51** to the conveyance path **53**. The image processing apparatus **1** includes registration rollers **54**, a secondary transfer roller **33**, a fixing unit **60**, sheet discharging rollers **55**, a sheet discharging port **56**, and a sheet discharging tray **57**. The conveyance path **53** extends to the sheet discharging port **56** while passing through the registration rollers **54**, the facing position between the driven roller **32** and the secondary transfer roller **33**, the fixing unit **60**, and the sheet discharging rollers **55**. The sheet discharging port **56** communicates with the sheet discharging tray **57**.

The sheet discharging rollers **55** discharge the sheets P and Px to the sheet discharging tray **57** through the sheet discharging port **56**. Ina case where the front and rear surfaces of the sheets P and Px are reversed, the sheet discharging rollers **55** are reversed when the leading ends of the sheets P and Px first exit from the sheet discharging port **56**, so that the sheets P and Px are inserted (switched back) into the image processing apparatus and the sheets P and Px are supplied to a reversing unit to be described later. The sheet discharging tray **57** holds the sheets P and Px that are discharged by the sheet discharging rollers **55**.

The registration rollers **54** are disposed at the upstream position in relation to the secondary transfer roller **33** in the sheet conveying direction of the conveyance path **53**. The registration rollers **54** convey the sheet P that is fed by the sheet feeding roller **52** in the image forming process of the image forming mode to the secondary transfer roller **33** so as to match the rotation timing of the transfer belt **30** that carries the erasable toner image.

The secondary transfer roller **33** is disposed at the position facing the driven roller **32** with the transfer belt **30** and the conveyance path **53** interposed therebetween. The secondary transfer roller **33** transfers the erasable toner image that is transferred to the transfer belt **30** in the image forming process of the image forming mode to the conveyed sheet P. The secondary transfer roller **33** constitutes a transfer unit along with the transfer belt **30**, the drive roller **31**, the driven roller **32**, and the primary transfer rollers **41** to **44**.

The image processing apparatus **1** includes the reversing unit that reverses the front and rear surfaces of the sheets P and Px. The reversing unit includes sheet feeding rollers **71**, **72**, and **73** and a conveyance path **70**. The conveyance path **70** extends from the termination end of the conveyance path **53** toward the upstream position in relation to the registration rollers **54** in the sheet conveying direction, and is joined to the conveyance path **53** at the upstream position. The sheet feeding rollers **71** to **73** and the conveyance path **70** guide the sheets P and Px that are switched back by the sheet discharging rollers **55** to the upstream position of the registration rollers **54**.

The image processing apparatus **1** includes an input tray **74**, a pickup roller **76**, a sheet feeding roller **77**, and a conveyance path **75**. The input tray **74** is disposed on the side wall of the image processing apparatus **1** in an attachable and detachable manner. The input tray **74** holds the sheet P of the image forming subject or the sheet Px of the image erasing process subject set by the user. The conveyance path **75** extends from the input tray **74** to the upstream position in relation to the registration rollers **54** in the sheet conveying direction, and is joined to the conveyance path **53** at the upstream position. The pickup roller **76** and the sheet feeding roller **77** are disposed along the conveyance path **75**. The pickup roller **76** extracts the sheets of the input tray **74** one by one. The sheet feeding roller **77** supplies the sheet extracted by the pickup roller **76** to the upstream position of the registration rollers **54**.

The fixing unit **60** is a heating unit that includes a heating roller **61** and a pressure roller **62**. In the image forming process of the image forming mode, the fixing unit **60** heats the conveyed sheet P at a first temperature, for example, 100° C. lower than a predetermined value (for example, 120° C.) by the heating roller **61** so that the erasable toner image transferred to the sheet P is fixed to the sheet P in a visible state. The fixing unit **60** serves as the erasing unit in the image erasing process of the image erasing mode. In the image erasing mode, the fixing unit **60** heats the conveyed sheet Px at a second temperature, for example, 130° C. equal to or higher than the predetermined value by the heating roller **61** so that the image of the sheet Px is erased.

The control configuration of the image processing apparatus **1** will be described with reference to FIG. **3**. FIG. **3** is a block diagram illustrating the control configuration of the image processing apparatus **1**. As illustrated in FIG. **3**, the image processing apparatus **1** includes a central processing unit (CPU) **80** as a computer, the operation panel **11**, a read

only memory (ROM) **81**, a random access memory (RAM) **82**, a hard disk drive (HDD) **83**, the scanning unit **84**, an image processing unit **85**, a process unit **86**, and a sensor unit **87**. The CPU **80** is connected to the operation panel **11**, the ROM **81**, the RAM **82**, the HDD **83**, the scanning unit **84**, the image processing unit **85**, the process unit **86**, and the sensor unit **87**.

FIG. **4** is a diagram illustrating a first guide screen **121** of the liquid crystal display unit **12** and the operation panel **11** used in the image processing apparatus **1**. As illustrated in FIG. **4**, the operation panel **11** includes a numeral key **13**, a start key **14**, a copy key **15**, a scan key **16**, and an erasing key **17**, and the like other than the touch panel type liquid crystal display unit **12**. The copy key **15** receives a user's operation for setting the image forming mode. The scan key **16** receives a user's operation for setting the image reading mode. The erasing key **17** receives a user's operation for setting the image erasing mode. The numeral key **13** receives a user's operation for setting the number of sheets to be subjected to the image erasing process and the like. The start key **14** receives a user's operation for instructing the execution of the image erasing process or the like.

The ROM **81** stores various control programs. The RAM **82** stores various data. The HDD **83** stores image data. As described above, the scanning unit **84** includes the carriage **4**, the exposure lamp **5**, the reflection mirrors **6** to **8**, the magnification lens block **9**, and the CCD **10**, and reads an image of a document on the document plate **2** by optically scanning the image. The image processing unit **85** processes the image signal output from the scanning unit **84** so as to convert the image signal into an image signal suitable for forming an image.

The process unit **86** includes the exposure unit **20**, the photosensitive drums **21** to **24**, the transfer belt **30**, the drive roller **31**, the driven roller **32**, the primary transfer rollers **41** to **44**, the secondary transfer roller **33**, the fixing unit **60**, and the conveyance paths **53**, **70**, and **75**. The process unit **86** further includes the cleaner, the neutralizing lamp, the charging unit, the developing unit, and the like disposed around the photosensitive drums **21** to **24**. The process unit **86** forms an image on the sheet P based on the image signal processed by the image processing unit **85** in the image forming process of the image forming mode.

In the image erasing process of the image erasing mode, the process unit **86** erases the image formed on the sheet Px by causing the fixing unit **60** to serve as the erasing unit.

The sensor unit **87** includes a plurality of sensors that detect the positions of the sheets P and Px in the conveyance paths **53**, **70**, and **75**. The plurality of sensors is provided at predetermined positions of the conveyance paths **53**, **70**, and **75**. For example, the respective sensors are switched on when detecting the leading ends of the sheets P and Px and are switched off when detecting the tail ends thereof. The CPU **80** determines the positions of the sheets P and Px in the conveyance paths **53**, **70**, and **75** by monitoring the on and off states of the respective sensors of the sensor unit **87**. Further, the CPU **80** determines a sheet jam occurrence state, a sheet jam occurrence position, and a sheet jam solving state by monitoring the on and off states of the respective sensors of the sensor unit **87**.

The CPU **80** counts the number of the sheets P and Px fed from the sheet feeding cassette **50** by monitoring, for example, the on and off states of the sensor provided between the sheet feeding roller **52** and the registration rollers **54** in the conveyance path **53** among the plurality of sensors. The CPU **80** counts the number of the sheets P and Px fed from the input tray **74** by monitoring, for example, the on and off states of the sensor provided between the sheet feeding roller **77** and the registration rollers **54** in the conveyance path **75** among the plurality of sensors. Hereinafter, a value obtained by counting the number of the sheets P and Px fed from the sheet feeding cassette **50** or the input tray **74** is referred to as a first counted value. The CPU **80** counts the number of the sheets P and Px discharged to the sheet discharging tray **57** by monitoring, for example, the on and off states of the sensor provided at a position near the sheet discharging rollers **55** in the conveyance path **53** among the plurality of sensors. Hereinafter, a value obtained by counting the number of the sheets P and Px discharged to the sheet discharging tray **57** is referred to as a second counted value.

The CPU **80** is a control unit that controls the execution of the main function of the image processing apparatus **1** based on the program inside the ROM **81**. When the copy key **15** of the operation panel **11** receives the operation of the user, the CPU **80** sets the operation mode of the image processing apparatus **1** to the image forming mode.

When the start key **14** of the operation panel **11** receives the operation of the user in the image forming mode, the CPU **80** starts the execution of the image forming process of the image processing apparatus **1** so that an image is formed on the sheet P fed from the sheet feeding cassette **50** or the input tray **74**. In the image forming process, the fixing unit **60** fixes the image (toner image) formed on the sheet P to the sheet P as described above.

When the erasing key **17** of the operation panel **11** receives the operation of the user, the CPU **80** sets the operation mode of the image processing apparatus **1** to the image erasing mode.

The CPU **80** starts the execution of the image erasing process of the image processing apparatus **1** so that an image formed on the sheet Px fed from the sheet feeding cassette **50** or the input tray **74** is erased when the start key **14** of the operation panel **11** receives the operation of the user in the image erasing mode. In the image erasing process, the fixing unit **60** erases the image formed on the sheet Pas described above.

When the image processing apparatus **1** starts the image forming process and the image erasing process, the CPU **80** obtains the first counted value by counting the number of the sheets fed from the sheet feeding cassette **50** or the input tray **74**. When the numeral key **13** of the operation panel **11** receives the setting of the number of the sheets from the user before the start key **14** of the operation panel **11** receives the operation of the user, the CPU **80** controls the operation of the image processing apparatus **1** so that the image forming process and the image erasing process are continued until the first counted value reaches the value set for the number of the sheets.

When the image processing apparatus **1** starts the image forming process and the image erasing process, the CPU **80** obtains the second counted value by counting the number of the sheets discharged to the sheet discharging tray **57**. When the jam to be described later does not occur during the image forming process and the image erasing process, the second counted value is equal to the first counted value. Accordingly, the CPU **80** may control the operation of the image processing apparatus **1** so that the image forming process and the image erasing process are continued until the second counted value reaches the value set for the number of the sheets.

A conveyance error may occur in which the sheets P and Px are jammed in the conveyance paths **53**, **70**, and **75** and the sheets are not conveyed during the image forming process and

the image erasing process of the image processing apparatus **1**. In the description below, the conveyance error is referred to as jam.

When the CPU **80** determines that the jam of the conveyed sheets P and Px occurs, the CPU sets the operation mode of the image processing apparatus **1** to an error mode. The CPU **80** controls the display unit **12** in order to notify the sheet jam occurrence state to the user and notify an action necessary for solving the jam of the sheet in the error mode. The display unit **12** displays the first guide screen (see FIG. **4**) for notifying the sheet jam occurrence state and the action necessary for solving the jam of the sheet.

The CPU **80** stops the process operation of the image processing apparatus **1** in the error mode. For example, when the jam occurs during the image forming process, the CPU **80** controls the image processing apparatus **1** so that the image forming process is stopped. Since the image forming process is stopped, the operation for the fixing process of the fixing unit **60** is stopped. When the jam occurs during the image erasing process, the CPU **80** controls the image processing apparatus **1** so that the image erasing process is stopped. Since the image erasing process is stopped, the operation for the image erasing process of the fixing unit **60** is stopped.

The sheets P and Px remain in the conveyance paths **53**, **70**, and **75** of the image processing apparatus **1** that stops the process. Hereinafter, the sheets that remain in the conveyance paths **53**, **70**, and **75** are referred to as the jam causing sheets. When the jam causing sheets P and Px are removed from the conveyance paths **53**, **70**, and **75** in a manner such that the user removes the jam causing sheets P and Px, the CPU **80** determines that the jam of the sheet is solved.

The CPU **80** cancels the error mode by determining that the jam of the sheet is solved, and resumes the process of the image processing apparatus **1** immediately before the occurrence of the jam of the sheet. For example, when the process of the image processing apparatus **1** immediately before the occurrence of the jam of the sheet is the image forming process, the CPU **80** controls the fixing unit **60** so that the fixing process of the fixing unit **60** is resumed. For example, when the process of the image processing apparatus **1** immediately before the occurrence of the jam of the sheet is the image erasing process, the CPU **80** controls the fixing unit **60** so that the image erasing process of the fixing unit **60** is resumed.

When the image erasing process is resumed, the CPU **80** performs a first control or a second control below. In the first control, the CPU **80** counts the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process along with the number of the jam causing sheets Px, and controls the fixing unit **60** so that the image erasing process is continued until the counted value reaches the user setting number. A value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** along with the number of the jam causing sheets Px is the first counted value. Accordingly, the fixing unit **60** continues the image erasing process until the first counted value reaches the user setting number.

In the second control, the CPU **80** counts the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process without including the number of the jam causing sheets Px, and controls the fixing unit **60** so that the image erasing process is continued until the counted value reaches the user setting number. A value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** without including the number of the jam causing sheets Px is the second counted value. Accordingly, the fixing unit **60** continues the image erasing process until the second counted value reaches the user setting number.

Further, when the error mode caused by the jam during the image erasing process is canceled, the CPU **80** controls the display unit **12** so that the user designates whether the value obtained by counting the number of the sheets Px fed from the sheet feeding cassette **50** or the input tray **74** and conveyed to the fixing unit **60** includes the jam causing sheet Px. The display unit **12** displays the second guide screen (see FIG. **6**) for causing the user to designate whether the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** includes the number of the jam causing sheets Px.

When the image erasing process is resumed, the CPU **80** performs any one control of the first control and the second control in response to the designation of the user in the second guide screen.

The control that is performed by the CPU **80** in the image erasing process of the image erasing mode will be described with reference to FIG. **5**. FIG. **5** is a flowchart illustrating the control operation of the image processing apparatus **1**. When the user wants to erase the images formed on, for example, ten sheets Px subjected to the image forming process, the ten sheets Px are set on, for example, the sheet feeding cassette **50** at the uppermost stage. Further, the user operates the erasing key **17** of the operation panel **11** in order to set the operation mode of the image processing apparatus **1** to the image erasing mode. Subsequently, the user sets the setting number of "10" corresponding to the number of the set sheets Px by operating the numeral key **13** of the operation panel **11**. The CPU **80** determines whether the operation panel **11** receives the operation of the user, sets the operation mode of the image processing apparatus **1** to the image erasing mode, and receives the set sheet number.

In ACT **101**, the CPU **80** determines whether the start key **14** of the operation panel **11** receives the operation of the user. When the CPU **80** determines that the start key **14** of the operation panel **11** receives the operation of the user (YES in ACT **101**), the operation of the image processing apparatus **1** proceeds to ACT **102**. In ACT **102**, the CPU **80** starts the image erasing process by controlling the pickup roller **51** and the sheet feeding roller **52** so that the sheet Px is fed from the sheet feeding cassette **50**. Specifically, the CPU **80** supplies ten sheets Px set on the sheet feeding cassette **50** to the conveyance path **53** one by one by controlling the operation of the pickup roller **51** and the sheet feeding roller **52**.

In ACT **103**, the CPU **80** determines the conveying position of the sheet Px in the conveyance paths **53**, **70**, and **75** and determines whether the jam occurs by monitoring the on and off states of the respective sensors of the sensor unit **87**.

When the CPU **80** determines that the jam occurs (YES in ACT **103**), the operation of the image processing apparatus **1** proceeds to ACT **104**. In ACT **104**, the CPU **80** controls the display unit **12** of the operation panel **11**. The display unit **12** displays the first guide screen **121** illustrated in FIG. **4**.

FIG. **4** is a diagram illustrating the first guide screen **121** that is displayed on the display unit **12** and the operation panel **11**. As illustrated in FIG. **4**, the first guide screen **121** includes a guide message **12***a* of the "jam occurrence" for notifying the occurrence of the jam and a guide message **12***b* that the "sheet jam occurs" for notifying the occurrence of the jam. The first guide screen **121** includes a guide message **12***c* of "please remove the sheet according to the guidance" for notifying the action necessary for solving the jam. The first guide screen **121** includes an image pattern **12***d* for notifying the jam occurrence position by a mark M.

The user may recognize the state where the sheet Px of the erasing process subject is jammed, the method of solving the jam, and the jam position inside the image processing apparatus **1** by looking at the first guide screen **121**. In many cases, the sheet Px that is removed by the user is discarded by the user unless the sheet Px has a considerably good condition.

In ACT **105**, the CPU **80** determines whether the jam is solved in a manner such that the user removes the jam causing sheet Px in the conveyance paths **53**, **70**, and **75** by monitoring the on and off states of the respective sensors of the sensor unit **87**. When the CPU **80** determines that the jam is solved (YES in ACT **105**), the operation of the image processing apparatus **1** proceeds to ACT **106**. In ACT **106**, the CPU **80** controls the display unit **12** of the operation panel **11**. The display unit **12** displays a second guide screen **122** illustrated in FIG. **6**.

FIG. **6** is a diagram illustrating the second guide screen **122** that is displayed on the display unit **12** and the operation panel **11**. As illustrated in FIG. **6**, the second guide screen **122** includes a guide message **12***e* of the "jam solving" for notifying the solving of the jam. The second guide screen **122** includes a guide message **12***f* of "does the number counted for the setting number includes the removed sheet?" for inquiring if the number of the sheets Px removed by the user is included in the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process. The second guide screen **122** includes a first response key **12***g* having a response message of "included" displayed thereon and a second response key **12***h* having a response message of "not included" displayed thereon for receiving the response of the user with respect to the inquiry. The number of the sheets Px that are removed by the user when the jam is solved is equal to the number of the jam causing sheets Px.

In the second guide screen **122**, the user operates the first response key **12***g* when the user wants to include the number of the jam causing sheets Px in the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60**. The user operates the second response key **12***h* when the user does not want include the number of the jam causing sheets Px in the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60**.

In ACT **107**, the CPU **80** determines whether any response key of the first response key **12***g* and the second response key **12***h* receives the operation of the user. When the CPU **80** determines that the first response key **12***g* receives the operation of the user (YES in ACT **107**), the operation of the image processing apparatus **1** proceeds to ACT **108**. In ACT **108**, the CPU **80** controls the display unit **12** of the operation panel **11**. The display unit **12** displays a third guide screen **123** illustrated in FIG. **7**.

FIG. **7** is a diagram illustrating the third guide screen **123** that is displayed on the display unit **12** and the operation panel **11**. As illustrated in FIG. **7**, the third guide screen **123** includes the guide message **12***e* of the "jam solving" for notifying the solving of the jam. The third guide screen **123** includes a guide message **12***i* of "is the erasing process continued?" for inquiring whether the image erasing process of the image erasing mode is continued in this way. The third guide screen **123** includes a third response key **12***j* having a response message of "YES" displayed thereon for enabling the continuation and a fourth response key **12***k* having a response message of "NO" displayed thereon for disabling the continuation.

In the third guide screen **123**, the user operates the third response key **12***j* when the user wants to continue the erasing process. The user operates the fourth response key **12***k* when the user does not want to continue the erasing process.

In ACT **109**, the CPU **80** determines whether any response key of the third response key **12***j* and the fourth response key **12***k* receives the operation of the user. When the CPU **80** determines that the third response key **12***j* receives the operation of the user (YES in ACT **109**), the operation of the image processing apparatus **1** proceeds to ACT **110**. In ACT **110**, the CPU **80** counts the number of the sheets Px conveyed to the fixing unit **60** by including the number of the jam causing sheets Px. For example, the number of the sheets Px conveyed to the fixing unit **60** is counted by including the number of the jam causing sheets Px of "1". Specifically, the CPU **80** counts the number of the sheets Px conveyed to the fixing unit **60** as the first counted value. In ACT **111**, the CPU **80** determines whether the first counted value as the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process reaches the user setting number of "10".

When the CPU **80** determines that the first counted value does not reach the user setting number (NO in ACT **111**), the operation of the image processing apparatus **1** returns to ACT **102**. In ACT **102**, the CPU **80** resumes the image erasing process by controlling the pickup roller **51** and the sheet feeding roller **52** so that the next sheet Px is fed from the sheet feeding cassette **50**.

When the CPU **80** determines that the first counted value reaches the user setting number (YES in ACT **111**), the operation of the image processing apparatus **1** proceeds to ACT **112**. In ACT **112**, the CPU **80** controls the display unit **12** of the operation panel **11**. The display unit **12** ends the image erasing process by displaying a fourth guide screen **124** illustrated in FIG. **8**.

FIG. **8** is a diagram illustrating the fourth guide screen **124** that is displayed on the display unit **12** and the operation panel **11**. As illustrated in FIG. **8**, the fourth guide screen **124** includes a guide message **12***m* of the "erasing process end" for notifying the end of the erasing process. The fourth guide screen **124** includes a first display section **12***n* having a guide message of the "setting number" for displaying the user setting number. The fourth guide screen **124** includes a second display section **12***o* having a guide message of the "number of the removed sheets due to the jam" for displaying the number of the jam causing sheets Px. The fourth guide screen **124** includes a third display section **12***p* having a guide message of the "completion number of sheets of erasing process" for displaying the number of the sheets Px subjected to the erasing process. The number of the jam causing sheets Px indicates the number of the sheets Px that are removed by the user from the inside of the image processing apparatus **1** for solving the jam. The number of the sheets Px subjected to the erasing process indicates the number of the sheets Px from which the image is removed and which are discharged to the sheet discharging tray **57**.

The CPU **80** controls the display unit **12** so that the user setting number received by the numeral key **13** of the operation panel **11** is displayed on the first display section **12***n*. The CPU **80** detects the number of the jam causing sheets (the number of the sheets Px removed by the user from the inside of the image processing apparatus **1**) by subtracting the second counted value from the first counted value. The CPU **80** controls the display unit **12** so that the value obtained by subtracting the second counted value from the first counted value is displayed on the second display section **12***o*. The CPU **80** controls the display unit **12** so that the second counted value is displayed on the second display section **12***o*.

The first display section **12***n* of the fourth guide screen **124** of FIG. **8** displays that the user setting number is, for example, "10". The second display section **12***o* of the fourth guide

screen **124** displays that the number of the jam causing sheets Px is, for example, "1". The third display section **12***p* of the fourth guide screen **124** displays that the number of the sheets subjected to the erasing process is, for example, "9".

In the fourth guide screen **124**, the user may recognize the number of the sheets Px set in advance by the display content of the first display section **12***n*. The user may recognize the number of the jam causing sheets, that is, the number of the sheets that are not subjected to the image erasing process by the display content of the first display section **12***o*. The user may recognize the number of the sheets that are subjected to the image erasing process by the display content of the first display section **12***p*.

As described above, when the number of the jam causing sheets Px is included in the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process, the sheets Px that are fed from the sheet feeding cassette **50** of the uppermost stage finally become ten sheets Px set by the user. Accordingly, the image erasing process is not unnecessarily performed on the originally set sheet, for example, the image forming sheet P other than the ten sheets Px of the sheet feeding cassette **50** of the uppermost stage. The image forming sheet P indicates the sheet which does not need the image erasing process and on which the image is not formed.

Further, since it is possible to avoid the unnecessary sheet feeding operation after the jam is solved, power is not consumed uselessly in the image processing apparatus **1**.

Meanwhile, in ACT **109**, when the CPU **80** determines that the fourth response key **12***k* receives the operation of the user (NO in ACT **109**), the operation of the image processing apparatus **1** proceeds to ACT **114**. In ACT **114**, the CPU **80** ends the image erasing process regardless of the value obtained by counting the number of the sheets Px fed from the sheet feeding cassette **50** and conveyed to the fixing unit **60**. After the image erasing process ends, in ACT **112**, the CPU **80** controls the display unit **12** of the operation panel **11**. The display unit **12** displays the fourth guide screen.

For example, when the jam occurs after the fourth sheet Px is fed from the sheet feeding cassette **50** and the number of the discharged sheets Px is three, the CPU **80** controls the display unit **12** so that the user setting number received by the numeral key **13** of the operation panel **11** is displayed on the first display section **12***n* of the fourth guide screen **124**. The CPU **80** controls the display unit **12** so that a value obtained by subtracting the second counted value from the first counted value is displayed on the second display section **12***o*. The CPU **80** controls the display unit **12** so that the second counted value is displayed on the second display section **12***o*. Accordingly, the first display section **12***n* displays that the user setting number is "10". The second display section **12***o* displays that the number of the jam causing sheets Px is "1". The third display section **12***p* displays that the number of the sheets subjected to the erasing process is "3".

In ACT **107**, when the CPU **80** determines that the second response key **12***h* receives the operation of the user (NO in ACT **107**), the operation of the image processing apparatus **1** proceeds to ACT **116**. In ACT **116**, the CPU **80** counts the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process without including the number of the jam causing sheets Px. Specifically, the CPU **80** counts the number of the sheets Px conveyed to the fixing unit **60** as the second counted value. In ACT **111**, the CPU **80** determines whether the second counted value as the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** reaches the user setting number of "10". When the CPU **80** determines that the second counted value does not reach the user setting number (NO in ACT **111**), the operation of the image processing apparatus **1** returns to ACT **102**. In ACT **102**, the CPU **80** resumes the image erasing process by controlling the pickup roller **51** and the sheet feeding roller **52** so that the next sheet Px is fed from the sheet feeding cassette **50**.

As described above, when the number of the jam causing sheets Px is not included in the counted number of the sheets Px conveyed to the fixing unit **60** for the image erasing process, the number of the sheets Px subjected to the image erasing process becomes equal to the user setting number.

When the user wants to perform the image erasing process on all sheets inside the sheet feeding cassette **50** of the uppermost stage, the number of all sheets inside the sheet feeding cassette **50** is set by the operation of the numeral key **13** of the operation panel **11**. When the numeral key **13** of the operation panel **11** receives the setting number corresponding to the number of all sheets inside the sheet feeding cassette **50**, the CPU **80** performs the image erasing process on all sheets inside the sheet feeding cassette **50** of the uppermost stage.

The image processing apparatus **1** according to a second embodiment will be described. In the image processing apparatus **1** according to the second embodiment, the CPU **80** performs a third control and a fourth control instead of the first control and the second control. The CPU **80** performs the third control when the jam occurrence position of the sheet Px is a predetermined area of the conveyance paths **53**, **70**, and **73**. In the third control, the CPU **80** controls the fixing unit **60** so that the image erasing process is continued until the first counted value as the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process by including the number of the jam causing sheets Px reaches the user setting number. Accordingly, the fixing unit **60** continues the image erasing process until the first counted value reaches the user setting number.

The CPU **80** performs the fourth control when the jam occurrence position of the sheet Px is other than the predetermined area of the conveyance paths **53**, **70**, and **73**. In the fourth control, the CPU **80** controls the fixing unit **60** so that the image erasing process is continued until the second counted value as the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process without including the number of the jam causing sheets Px reaches the user setting number. Accordingly, the fixing unit **60** continues the image erasing process until the second counted value reaches the user setting number. The configuration of the image processing apparatus **1** according to the second embodiment is the same as that of the first embodiment except for the third control and the fourth control. Accordingly, in the description below, the description other than the third control and the fourth control will not be repeated.

In the erasing process of the image erasing mode, the control and the revolving parts thereof different from the first embodiment among the control executed by the CPU **80** will be described with reference to the flowchart of FIG. **9**. In ACT **107**, when the CPU **80** determines that the first response key **12***g* receives the operation of the user (YES in ACT **107**), the operation of the image processing apparatus **1** proceeds to ACT **201**. In ACT **201**, the CPU **80** determines whether the position of the jam causing sheet Px is the predetermined area by monitoring, for example, the on and off states of the respective sensors of the sensor unit **87**.

The predetermined area is a conveyance path that has many curved portions or a conveyance path that includes a plurality of rollers for conveying the sheet. In other words, the predetermined area is an area where the jam causing sheet is likely

to be damaged largely. Specifically, for example, the predetermined area corresponds to the area from the registration rollers **54** to the sheet discharging port **56** in the conveyance path **53** and the entire area of the reversing conveyance path **70**.

When the CPU **80** determines that the position of the jam causing sheet Px is the predetermined area (YES in ACT **201**), the operation of the image processing apparatus **1** proceeds to ACT **108**. In ACT **108**, the CPU **80** controls the display unit **12** of the operation panel **11**. As described above, the display unit **12** displays the third guide screen **123**.

In ACT **109**, when the CPU **80** determines that the third response key **12***j* receives the operation of the user (YES in ACT **109**), the operation of the image processing apparatus **1** proceeds to ACT **110**. In ACT **110**, the CPU **80** determines whether the first counted value reaches the user setting number of "10". When the CPU **80** determines that the first counted value does not reach the user setting number of "10" (NO in ACT **110**), the operation of the image processing apparatus **1** returns to ACT **102**. In ACT **102**, the CPU **80** resumes the operation of feeding the next sheet Px as described above.

In ACT **201**, when the CPU **80** determines that the position of the jam causing sheet Px is other than the predetermined area (NO in ACT **201**), the operation of the image processing apparatus **1** proceeds to ACT **202**. In ACT **202**, the CPU **80** controls the display unit **12** of the operation panel **11**. The display unit **12** displays a fifth guide screen **125** illustrated in FIG. **10**. In ACT **203**, the CPU **80** counts the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process without including the number of the jam causing sheets Px as in ACT **116**. For example, when one sheet Px remains inside the image processing apparatus **1** due to the jam and one sheet Px is removed from the image processing apparatus **1** by the user so as to solve the jam, the CPU **80** counts the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process without including the number of the sheets Px of "1". Specifically, the CPU **80** counts the number of the sheets Px conveyed to the fixing unit **60** as the second counted value.

FIG. **10** is a diagram illustrating the fifth guide screen **125** that is displayed on the display unit **12** and the operation panel **11**. As illustrated in FIG. **10**, the fifth guide screen **125** includes the guide message **12***e* of the "jam solving" for notifying the solving of the jam. The fifth guide screen **125** includes a guide message **12***q* of the "removed sheets may be set again for the usage" for notifying the possibility that the sheets removed from the image processing apparatus **1** by the user to solve the jam may be reused.

The possibility that the removed sheets may be reused indicates the possibility that the sheets Px are not damaged and hence the sheets Px may be set on the sheet feeding cassette **50** of the uppermost stage for the image erasing process.

The user recognizes the possibility that the removed sheets Px may be reused by looking at the fifth guide screen **125**. When the removed sheets Px are not largely damaged in actual fact, the sheets Px are set again on the sheet feeding cassette **50** of the uppermost stage. After the sheets Px are set again, the user operates the start key **14** of the operation panel **11**.

In ACT **204**, the CPU **80** determines whether the start key **14** of the operation panel **11** receives the operation of the user. When the CPU **80** determines that the start key **14** of the operation panel **11** receives the operation of the user (YES in ACT **101**), the operation of the image processing apparatus **1** proceeds to ACT **111**. In ACT **111**, as described above, the CPU **80** determines whether the second counted value reaches the user setting number of "10". When the CPU **80** determines that the second counted value does not reach the user setting number of "10" (NO in ACT **111**), the operation of the image processing apparatus **1** returns to ACT **102**. In ACT **102**, the CPU **80** resumes the operation of feeding the next sheet Px as described above.

As described above, according to the image processing apparatus **1** of the second embodiment, it is possible to determine whether the jam causing sheet Px is largely damaged by the position of the jam causing sheet Px. When the CPU **80** of the image processing apparatus **1** determines that the jam causing sheet Px is not largely damaged, the CPU **80** counts the number of the sheets Px conveyed to the fixing unit **60** without including the number of the jam causing sheets Px. Further, the CPU **80** displays the message (the fifth guide screen **125**) that urges the user to set the jam causing sheet Px on the sheet feeding cassette **50** again on the display unit **12**. Accordingly, the user may effectively use the reusable sheet Px. When the sheet is used more frequently, natural resources may be saved greatly.

In the above-described embodiments, a case has been described in which the image formed sheet Px is set on the sheet feeding cassette **50** of the uppermost stage and is fed for the image erasing process. However, the position of setting the sheet Px, that is, the position of feeding the sheet Px is not limited to the sheet feeding cassette **50** of the uppermost stage, and may be the sheet feeding cassette **50** or the input tray **74** of the lower stage.

In the above-described embodiments, a configuration has been described in which the user designates whether the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** for the image erasing process includes the number of the jam causing sheets Px through the second guide screen **122** after the jam is solved. However, whether the number of the jam causing sheets Px is included in the value obtained by counting the number of the sheets Px conveyed to the fixing unit **60** may be designated in a manner such that the user initially sets any mode of the mode in which the counted number includes the jam causing sheet Px and the mode in which the counted number does not include the jam causing sheet Px instead of the method in which the image processing apparatus **1** displays the second guide screen **122**.

The content of the guide message or the image pattern that is displayed on the display unit **12** of the operation panel **11** is not limited to the above-described embodiments, and may be modified into various forms. The content of the guide message or the image pattern that is displayed on the display unit **12** may be appropriately changed in response to the culture or the language in a region where the image processing apparatus **1** is installed.

While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

What is claimed is:

1. An image processing apparatus comprising:

an erasing unit configured to erase images respectively formed on a plurality of conveyed recording media by performing an image erasing process on each conveyed recording medium;

an operation panel configured to receive a setting number of the recording media from which the images are to be erased, the operation panel including a display unit; and

a control unit configured to control the image erasing process performed by the erasing unit, wherein

when a conveyance error occurs with respect to at least one of the recording media:

the control unit stops the image erasing process performed by the erasing unit with respect to at least one of the recording media,

the display unit displays a guide screen and receives via the guide screen a selected counting method indicating whether to count a number of the recording media conveyed to the erasing unit by including the at least one of the recording media causing the conveyance error, and

the control unit controls the erasing unit to continue the image erasing process after the conveyance error is cleared and until the number counted according to the selected counting method reaches the setting number received by the operation panel so that:

when the selected counting method includes counting the number of the at least one of the recording media causing the conveyance error, the control unit controls the erasing unit to continue the image erasing process until the value obtained by counting the number of the recording media conveyed to the erasing unit including the number of the at least one recording media causing the conveyance error reaches the setting number, and

when the selected counting method does not include counting the number of the at least one recording media causing the conveyance error, the control unit controls the erasing unit to continue the image erasing process until the value obtained by counting the number of the recording media conveyed to the erasing unit without including the number of the at least one recording media causing the conveyance error reaches the setting number.

2. The image processing apparatus according to claim 1,

wherein when the image erasing process ends, the display unit displays an end guide screen that includes the number of the recording media causing the conveyance error and the number of the recording media subjected to the image erasing process.

3. The image processing apparatus according to claim 2,

wherein when the selected counting method includes counting the number of the at least one recording media causing the conveyance error, the total sum of the number of the at least one recording media causing the conveyance error and the number of the recording media subjected to the image erasing process included in the end guide screen is equal to the setting number.

4. The image processing apparatus according to claim 3,

wherein the control unit:

determines whether a position of the conveyance error of the at least one recording media causing the conveyance error is a predetermined area on a conveyance path, and

determines whether to count the number of the recording media conveyed to the erasing unit by including the number of the at least one recording media causing the conveyance error based on the determination result.

5. The image processing apparatus according to claim 4,

wherein the predetermined area is an area of the conveyance path with plural curved portions or an area of the conveyance path with plural rollers for conveying the recording medium.

6. The image processing apparatus according to claim 5,

wherein when the position of the conveyance error is not the predetermined area, the control unit counts the number of the recording media conveyed to the erasing unit without including the number of the at least one recording media causing the conveyance error.

7. The image processing apparatus according to claim 6,

wherein when the position of the conveyance error is not the predetermined area, the display unit displays a guide screen for informing of a possibility that the at least one recording media causing the conveyance error is reusable.

* * * * *